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INSTRUCTIONAL QUALITY CONTROL SYSTEMS.

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A REVIEW OF THE LITERATURE, A MAIL SURVEY, AND A TEXTUAL ANALYSIS OF JUNIOR COLLEGE DOCUMENTS INDICATE THAT, WHILE CALIFORNIA JUNIOR COLLEGES ARE CONCERNED ABOUT THE QUALITY AND EFFECTIVENESS OF INSTRUCTION, CONTROL OF THAT QUALITY IS RARELY A SYSTEMATIC ROUTINE ENTERPRISE BASED ON EXAMINATION OF BEHAVIOR CHANGES IN STUDENTS FOLLOWING INSTRUCTION. USUALLY THE PROCESS IS A NONSYSTEMATIC, SPORADIC EXAMINATION OF THE INSTRUCTOR OR THE INSTITUTION, AND SUCH ANALYSES DO NOT MODIFY THE OBSERVABLE CHARACTERISTICS OF THE INSTRUCTIONAL SYSTEM OR THE STUDENTS. FACULTY ORGANIZATIONS EXIST, BUT THEY ARE NOT TYPICALLY CHARGED WITH MAJOR RESPONSIBILITY FOR THE CONTROL OF INSTRUCTIONAL QUALITY OR THE IMPROVEMENT OF THE EFFECTIVENESS OF INSTRUCTION. THIS SITUATION IS IN CONTRAST TO THE FACT THAT TEACHERS ARE CURRENTLY TRAINED BY TEACHER EDUCATION PROGRAMS TO BE SUCCESSFUL IN THIS TYPE OF ENDEAVOR. UTILIZATION OF A QUALITY CONTROL SYSTEM FOR THE CLASSROOM HAS BEEN FOUND TO RESULT IN GREATER STUDENT GAINS (EXAMPLES OF SUCH GAINS ARE GIVEN). YET, NO MAJOR EFFORT HAS BEEN MADE TO EVALUATE INSTRUCTIONAL SYSTEMS IN A SYSTEMATIC ROUTINE FASHION AS IS DONE IN INDUSTRY, MEDICINE, AND OTHER SERVICE ORGANIZATIONS. (HS)

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Chapter I. The Problem and Definition of Terms Used

There has long been resistance in Education to the proposition that the effectiveness of an educational institution must be measured in terms of the results accomplished, (Ayres, 1912). However, we are now seeing a number of proposals based on the assumption that the American public expects results from its investment in schooling. Five of these include:

a) provisions of Title I of the Elementary and Secondary Act of 1965 requiring objective measures and reports of educational achievement,

b) a plan for national Assessment of educational achievement described in Phi Delta Kappan, September, 1965,

c) the report of the joint committee of AERA, APA and DAVI-NEA entitled Criteria for Assessing Programed Instructional Materials,

d) the recommendation of follow-up studies of junior college students by the American Association of Junior Colleges, (O'Connor, 1965), as a tool for instructional improvement,

e) the choice of the "improvement of instruction" as the number one priority for study by CJCA by 65 California Junior College administrators, (Peterson, 1965).

If then, there is to be an attempt to assess the instructional effectiveness of our educational institutions, how can this be accomplished most efficiently and least expensively all-the-while preserving the uniqueness and individuality of the community junior college? Is the answer in national assessment? Local assessment? By whom? How often?

A recent development in California junior colleges is the legal recognition of academic senates and the development of such "advisory bodies" in most junior colleges. In this trend to measure the results of instruction, what part could (or should) this group play? Are these academic senates to concern themselves with the assessment of the quality of instruction?

National and local professional organizations interested in the enlarging community college movement, (AAJC, AAUP, CJCA, CJCFA, CTA-Nea-AHE), speak out from time to time on "quality" in higher education as does the United States Department of Health Education and Welfare Office of Education, (Baskin, 1960). What part will each of these groups have to play in the organization of measures of instructional effectiveness?

A. The Problem:

The study attempts to answer the following questions:

1. Is it possible to define instructional quality? If so;
2. Is it possible to describe the process of instruction as a system? If so;
3. Is it possible to apply the concept of "quality control" as used by business, industry, medicine, the Armed Forces, etc. to an instructional system? If so;
4. Is it possible to describe the elements in an instructional quality control system? If so;
5. Do such instructional quality control systems exist in California junior colleges?

Limits: The study will be limited to California junior colleges who are members of California Junior College Association and accredited by the Western Association of Schools and Colleges.

Specifically, this study attempts to:

a) describe the concepts of "instructional system" and "quality of instruction"

b) analyze the need for control of the quality of instruction

c) describe quality control systems as used in business, industry, medicine, public organizations, etc.

d) describe the necessary elements in an instructional quality control system

e) report the results of a survey to determine the existence of California instructional quality control systems

f) propose a model for the establishment of an instructional quality control system in California junior colleges.

B. Definition of Terms:

curriculum: the sequence of instructional experiences provided for learners

instruction: an organized system for producing learning in students; a service to learners provided by a junior college

learning: a more or less permanent change in behavior on the part of the learner following instruction

quality: of a specified standard of excellence; having the qualities expected or established as acceptable

system: a specified series of relations; a bounded collection of interdependent parts, devoted to the accomplishment of some goal(s), with the parts maintained in a steady state of relationship to each other and the environment by means of:

a) standard modes of operation

b) feedback about the consequences of system actions

instructional system: a system for producing learning

Instructional Systems Approach: A concept borrowed from engineering and industry which replaces piecemeal educational planning with a rational, effecient deployment of human and technical resources. A conceptual framework for planning, orderly consideration of functions and resources, including personnel and technical facilities, and a phased and ordered sequence of events leading to the accomplishment of specified and operationally defined achievements; one subsystem of such a system being a quality control system.

feedback: information about the effects or consequences of actions, relayed to other elements in a system.

teaching behavior: (teaching) a set of actions engaging a learner in a situation from which he acquires new or modified ways of behaving.

quality control: Q.C.; a system of specifications, operations and inspections to maintain the quality of a product at a specified level.

instructional quality control: I.Q.C.; a formalized system of specification, production and inspection for the routine assessment of the extent to which the end-of-course or end-of-curriculum behavior has been achieved by the student in light of pre-specified standards of performance and involving modification of the elements.

The Concept of An "Instructional System"

Since World War II, largely as a result of government-sponsored research, increased attention has been focused on: the act of instruction, instructional systems, instructional technology and theories of instruction, (Maccia, 1962, NSSE, 1964). However, in the careful

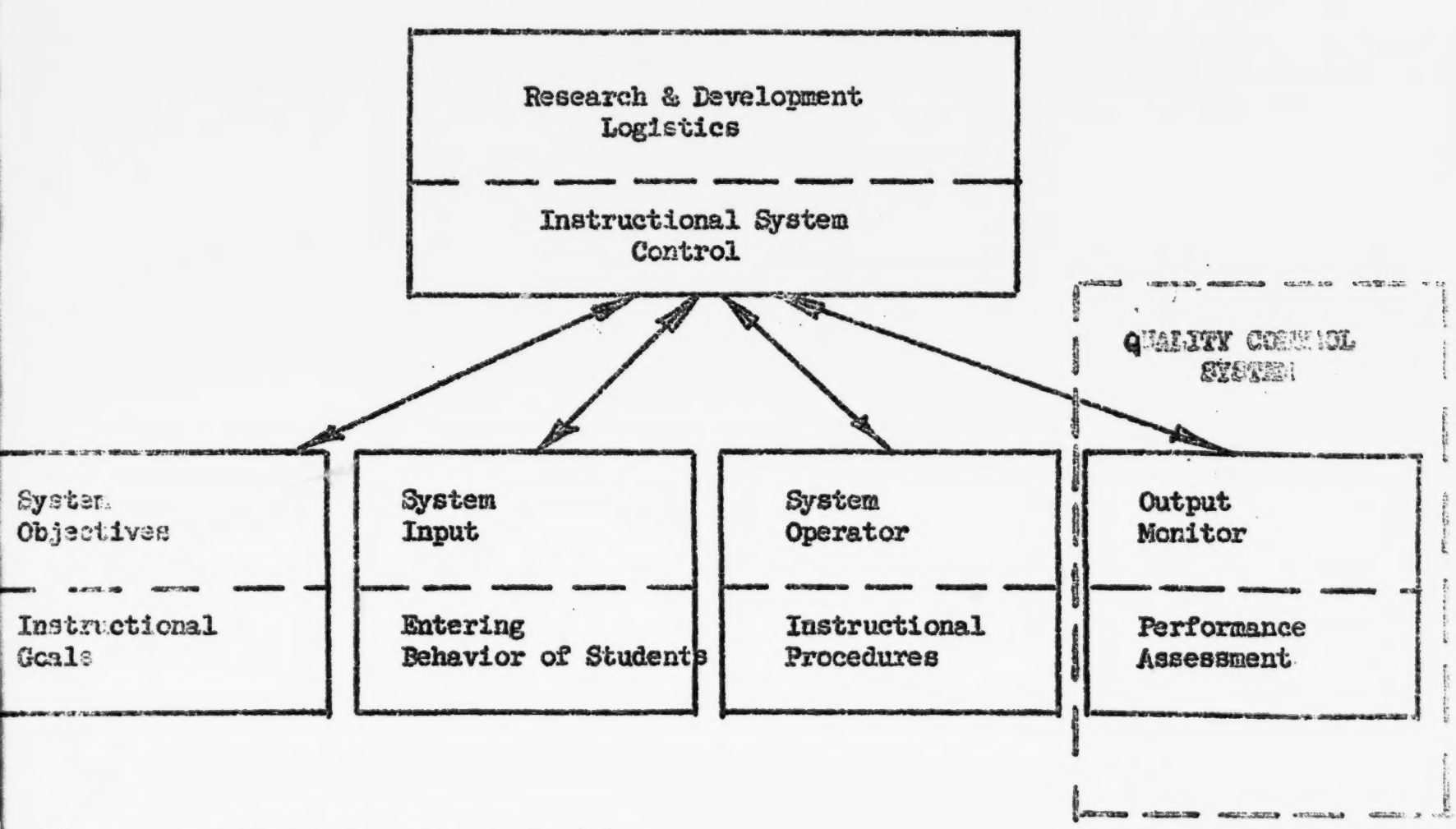
design, development and testing of instructional systems, both industry and the armed forces have moved ahead of the schools (De Cecco, 1964).

Instructional systems for public educational institutions have been formulated and published; (Corrigan, 1965; Gorow, 1965, Glaser, 1962; Popham, 1965; Silverman, 1965; Travers, 1962).

The following are examples of some instructal systems.

Perhaps the simplest and generalizable is that of Glaser (1962):

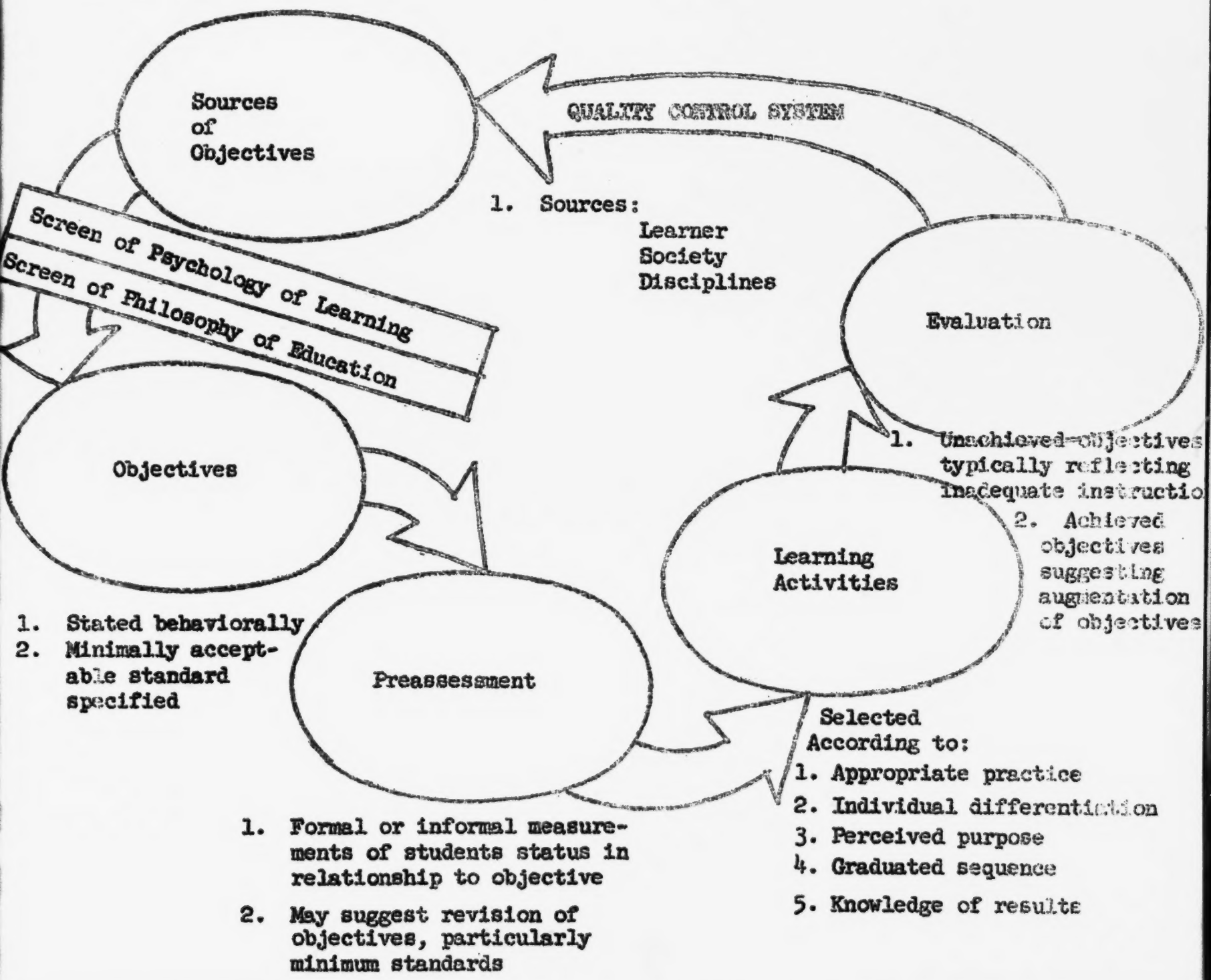
Chart #1: The Instructional System



Adapted from Glaser (1962)

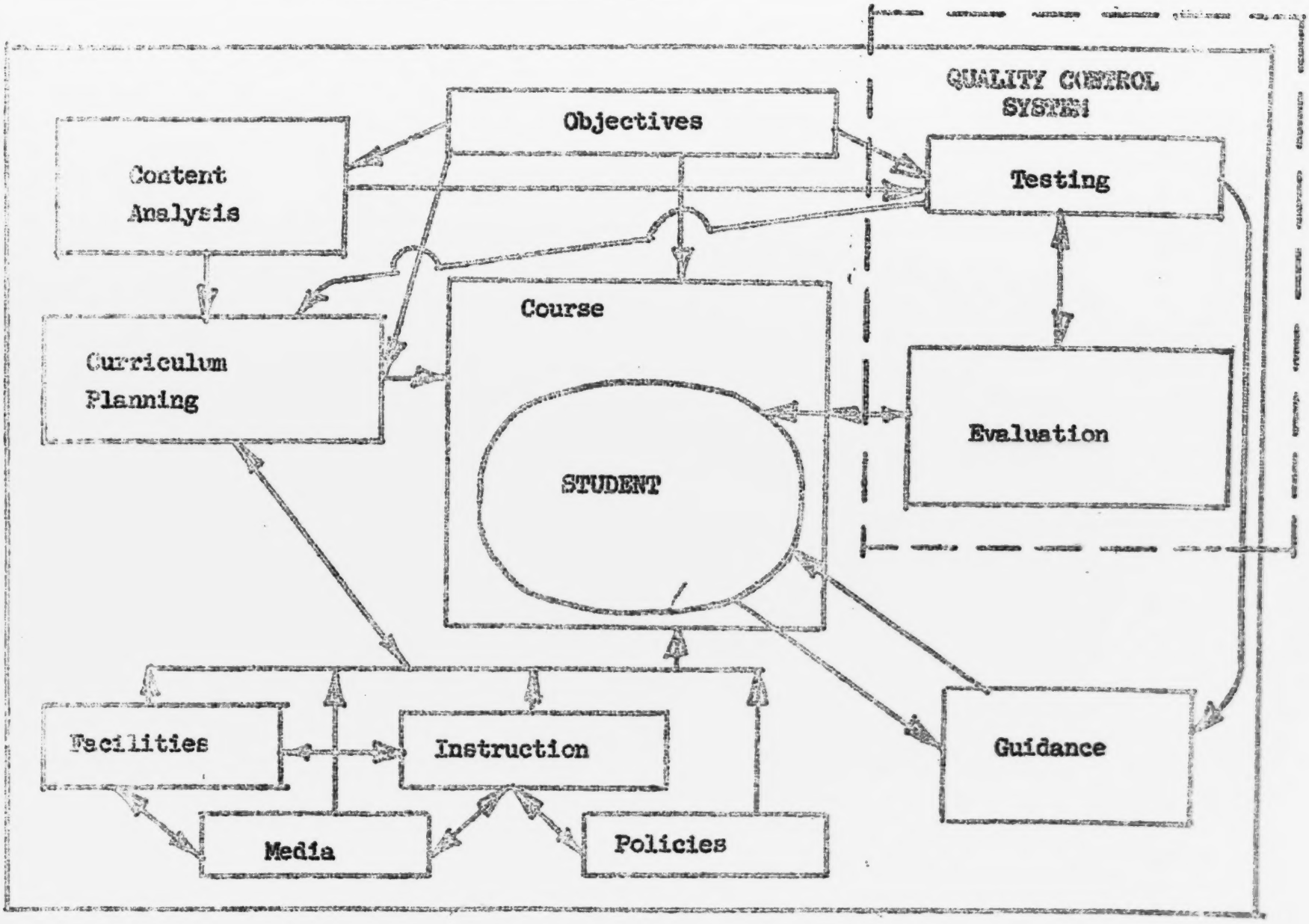
Another very similar conceptualization of the instructional process is posited by Popham, based on Tyler's curriculum rationale and including four additional sub-systems (Popham 1965):

Chart #2: <u>The Instructional Paradigm</u>:



A more elaborate model is proposed by Gorow, 1965:

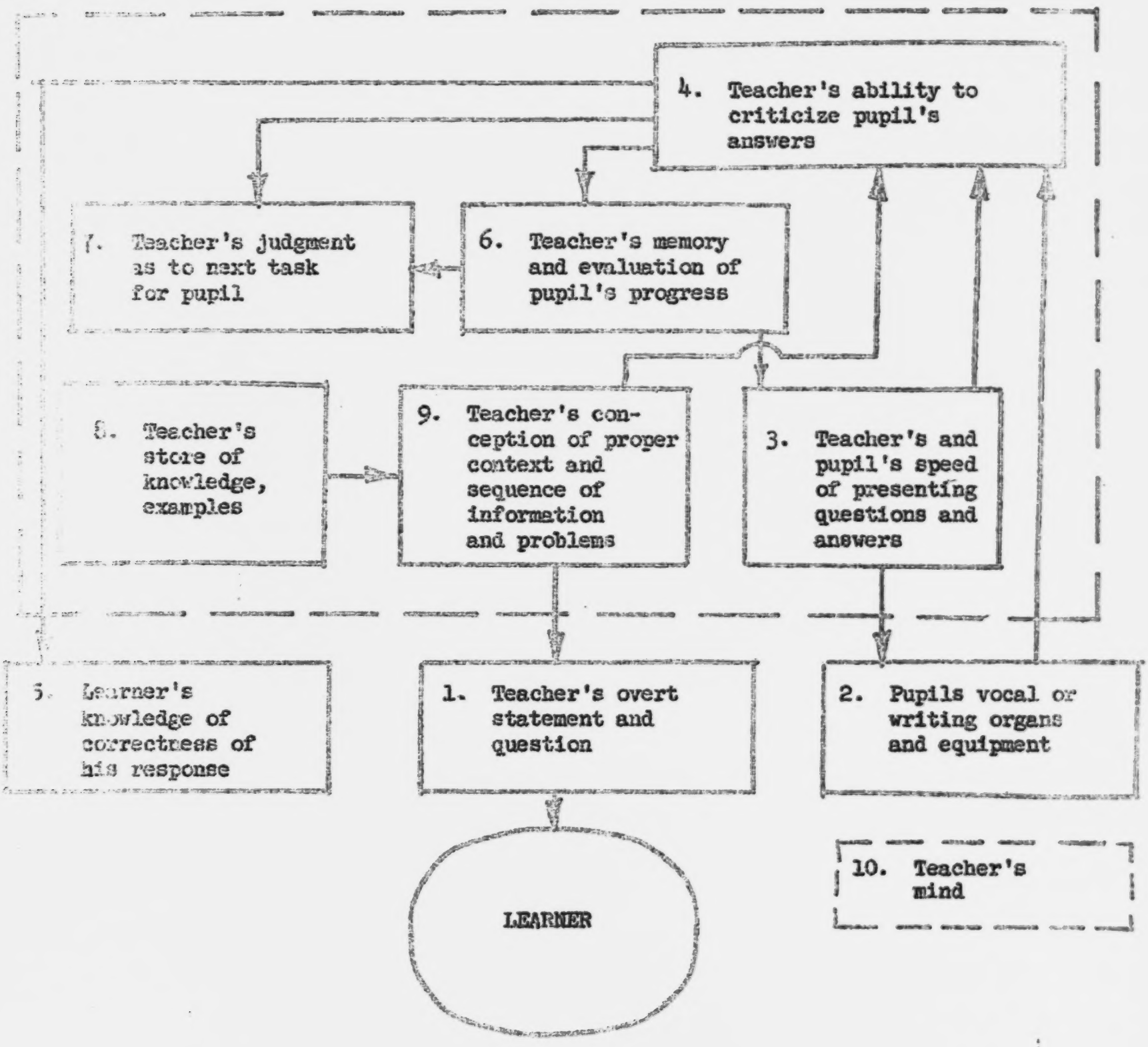
Chart #3: <u>An Instructional System</u>



A collection of additional paradigms or models exists in Gage's chapter in Gage (Editor) <u>Handbook of Research on Teaching</u>.

These differ from the previous three systems in that rather than describing instructional systems, they describe <u>teacher-learner interactions</u> (paradigms of teaching). As an example, Gage has adapted Stulorow's (1961) Teaching Machine System into a teaching paradigm:

Chart #4: <u>Adaptation by Gage of Teaching Machine System</u>


4. Teacher's ability to criticize pupil's answers
7. Teacher's judgment as to next task for pupil
6. Teacher's memory and evaluation of pupil's progress
8. Teacher's store of knowledge, examples
9. Teacher's conception of proper context and sequence of information and problems
3. Teacher's and pupil's speed of presenting questions and answers
5. Learner's knowledge of correctness of his response
1. Teacher's overt statement and question
2. Pupils vocal or writing organs and equipment
LEARNER
10. Teacher's mind

Gage also points out that: "every practitioner is theorizing, yet, of course, all men . . . are theorists. They differ not in whether they use theory but in the degree to which they are aware of the theory they use. The choice before the man in the street and the research worker alike is not whether to theorize but whether to articulate his theory." Gage suggests that every junior college is operating on the basis of a theory of instruction, (an instructional system). The question remaining is, have all junior colleges detailed their practice, their rationale and theoretical construct for their instructional system?

D. The Concept of "Quality of Instruction."

Quality of instruction has been a concern of educators and lay citizens for the last century and more. At least six major groups have documented their concern.

1. The existence of accreditation systems for Education and 22 other educating disciplines attest to the continuing quest for improved instruction, (NCTEPS, 1963).
2. Educational supervision has accepted as its primary task the improvement of instruction.
3. The federal government continues to be concerned with educational quality (U.S. Congress, 1962). Francis Keppel, Commissioner of Education, in reviewing our "new national objectives" mentions first: "to raise the quality of education in our schools everywhere and for everyone. In the 20th century, we cannot tolerate second-class education if we are to remain a first-class nation." (Keppel, 1965)

4. National educational organizations meet regularly to attempt to ensure quality instructional operations (Deferrari, 1961; WIC HE, 1959; Ferry, 1965).
5. California junior college administrators name the improvement of instruction as the number-one priority item on their list of needs. (Peterson, 1965)
6. Citizen groups, many of the critics being scientists, businessmen, or industrialists, question the quality of instruction with increasing alarm. (Scott et al, 1959; Saligman, 1958)

In order to answer this criticism from lay individuals and organizations, most educators tend to offer reassurance rather than research. De Cecco notes: "In the careful design, development and testing of instructional systems, both industry and the armed forces have moved ahead of the schools. Some professional training programs in medicine, dentistry, and engineering are now undergoing careful systems analyses and development, but the school curriculum has not been similarly active." (DeCecco, 1964, p. 68).

B. <u>The Concept of "Quality Control"</u>

The development of mass production technics for interchangeable parts has made necessary a system of inspection and quality control. A company can ill afford to continue to produce defective parts. Such a system came into being in this country and England after 1900. This movement has grown continuously since its inception, because in a competitive free-enterprise system, no successful business or industry can compete without control of its production costs and product integrity. (Juran, 1951)

Grant (1952) has supplied a model for both manufacturing and non-manufacturing quality control systems based upon:

a) <u>specification</u> of the quality limits of the product or service

b) <u>production</u> of the product or services with such specifications

c) <u>inspection</u> of the product's or services's quality

So widespread is the practice of quality control today that no government contract is granted to a business concern unless that company utilizes a quality control system (U.S. Congress, 1962, b).

The non-manufacturing model for use by service organizations, particularly fiscal systems and management is detailed by Ackoff, (1962); Ackoff, et al, (1962); Churchman (1963); Hansen, (1963); and Mesarovic, (1964).

The field of medicine, because of the concern for "minimum error," was among the first non-industrial utilizers of methods improvement and quality control systems (Busch et al, 1965).

An adaptation of quality control systemization has been field tested and proven for public school fiscal planning and administration by Columbia University's Institute of Administrative Research (Mort, 1954; Mort et al, 1960; Vincent, 1961).

Typical Characteristics of A Quality Control System:

1. A system is specific to a unique product or service (Juran, 1951).
2. Product or service is defined in operational definitions (Grant, 1952).
3. System is orgainized at lowest possible level of production (Juran, 1951).
4. Limits of allowable variation are specified (Tiffin & McCormick, 1965) in systematic order.
5. Variety of quality aspects are measured (Boguslaw, 1965).
6. Samples are utilized (Hansen, 1963).
7. Results of inspection modifies other elements in system (Wiener, 1954).
8. Systematic routine sampling is made at specified time interval (Grant, 1952).

Chapter II: Model for the Analysis of Quality Control in An Instructional System

Adapting the previous characteristics of a business, industrial, or service organization quality control system to their logical counterparts in an instructional system, such a system would:

1. measure students against unique institutional goals,
2. define goals behaviorally,
3. be organized at the classroom level,
4. be systematic,
5. measure more than one dimension of quality,
6. involve samples of students,
7. modify other elements in the instructional system,
8. involve routine schedules,

Each of the above suggestions has been the prior concern of other individuals or organizations. Below is the documentation of their suggestions. Such a system would:

1. Measure student's gains in a particular instructional system (a particular junior college). This notion is in agreement with:
   a) the dualistic concept of excellence of Gardner (1961),
   b) the preservation of institutional uniqueness suggested by Pickett (1962),
   c) the uniqueness of institutional self-evaluation suggestion by Dressel, (1961),
   d) the findings of Richards et al (1965) that junior colleges differ significantly from four year colleges on 36 dimensions, suggesting that attempting to evaluate junior college students against 4 year college criteria would be inappropriate.

2. Define student expectations behaviorally and operationally. This suggestion has been made repeatedly since 1930 by Tyler (1950, 1958); (AERA, 1952) Popham, 1965; Ryans (1960), Mager, (1961); McDonald, (1965) and others.

3. The specification, production and inspection of quality should be carried out at the lowest possible level of organization; in the classroom by the instructor or by groups of instructors. This characteristic agrees with the suggestions of McDonald (1965) and Gorow (1965) that instructors are best equipped and most strategically located to control quality of student gains. It is also consistent with the finding by Ammons (1961) that instructors who have not formally specified educational objectives make curricular decisions contrary to the institutional goals.

4. Inspection of student's gains would be formalized and systematized.

Mayhew (in Lins (Editor), 1963) has noted that prior follow-up studies had weaknesses because of lack of systematic planning and follow-through.

Batie (1965) has shown how the systematic analysis of junior college students can facilitate the prediction of their success in specific courses of study.

The U.S. Office of Education is currently financing the training of California educational planners in the use of system analysis techniques so that these techniques can be applied to research and development in California schools, (Miller, 1966).

5. Focus on a large number of dimensions of student gains, rather than a single one. Coster et al, (1960 and Biddle and Ellena (1964) document long-range research programs which are based upon the assessment of a variety of changes in students. Cronbach (1963)

adds that at least three types of evaluation of students are needed. Gillies (1966) has described a system in which student's gains can be measured on an individual or classroom basis rather than lumping all measures together into a single average (e.g. grade point average). Goodlad decries the heavy emphasis on the measurement of "narrow abstract verbal learnings," (1965,a). The use of grades as a measure of educational quality may be inappropriate in light of the lack of correlation between grades (the most common junior college measure of student achievement) and adult success has been reviewed by Hoyt (1965).

6. Samples of students would be evaluated through controlled sampling techniques resulting in statistically valid measures. Astin and Panos (1966) describe a field study of a sample of junior college students (over 20,000) carried on during 1965 in which techniques were developed for a "national data bank for higher education."

7. Modify other elements in the instructional system on the basis of feedback from the evaluation of student's gains. Miles (1964) has detailed how such a feedback would show the need for adaptation in another part of the system. Gleazer (1965) has noted that such a modification does not always take place. "Community colleges in general have tended to stay well within the boundaries of current educational practice and procedure. Frequently described as flexible, dynamic, new and responsive, the junior college does not often fit that description." (p.17)

8. Operate on a timed schedule of specification, production and evaluation, O'Connor (1965) suggests that regular "follow-up research is as important to the junior college as market research is to a pioneering business." (p.9)

Summary of Model

Briefly stated, a quality control system for an educational institution would: measure student gains . . . compared with unique institutional goals . . . stated as student behaviors . . . through classroom evaluation . . . on a large number of dimensions . . . utilizing samples of students . . . so as to modify the whole instructional system . . . on a scheduled basis. The comparison of business and education quality control systems is shown on Chart #5; Quality Control Systems.

Quality Control Systems:

Graphically, an instructional quality control system would appear as a three phase process: (see Chart #6: An Instructional Quality Control System)

Such an instructional quality control system as is summarized here would be likely to be found in the characterization of an "ideal school" by Silverman and Carter (1965).

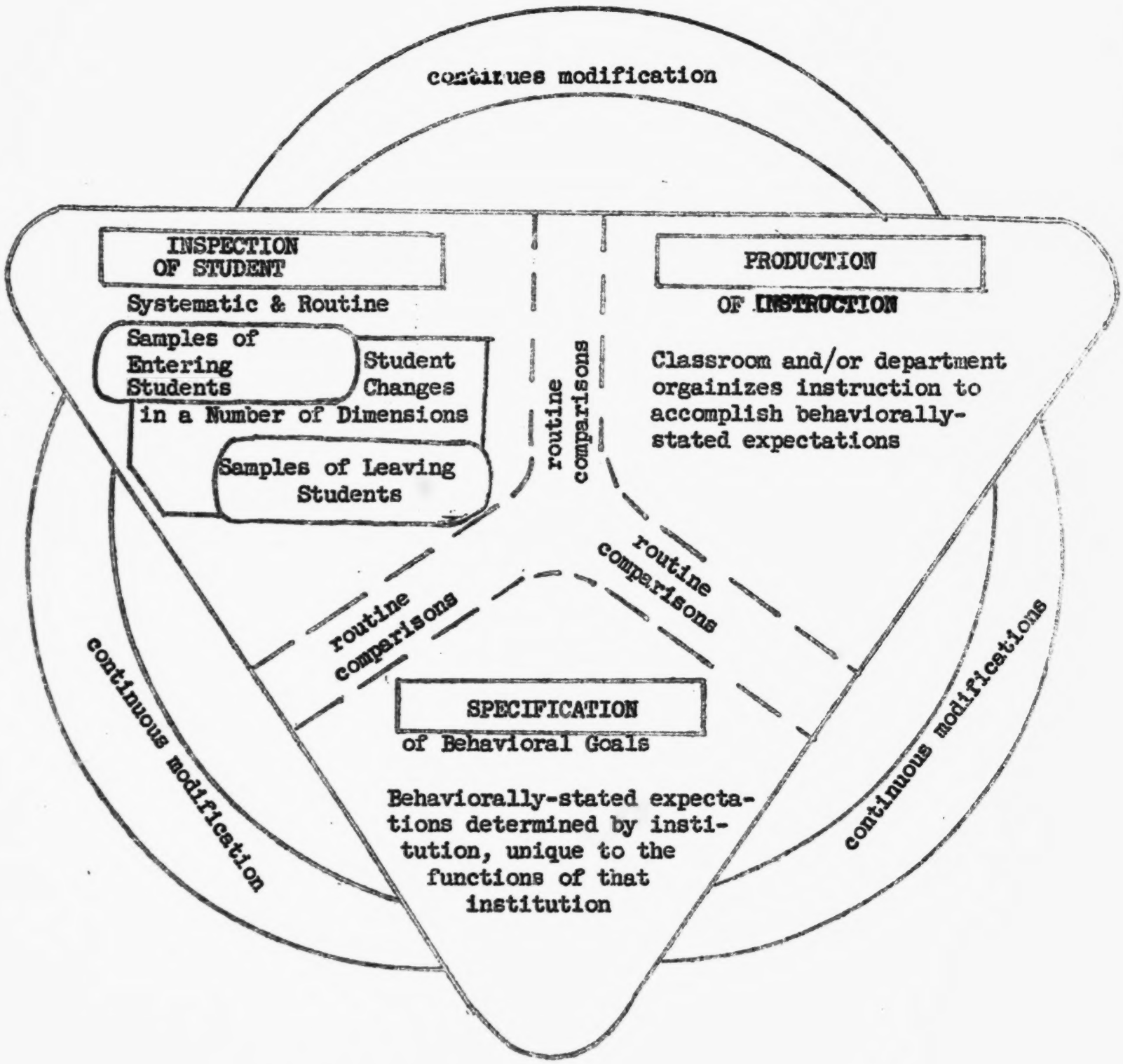
1. The objectives of the school are clearly specified.
2. The school "system" is evaluated and modified to maximize the extent to which these objectives are achieved.
3. The school staff has an experimental orientation and modifies materials and procedures to successfully approximate these objectives.
4. A competent research staff (composed of content experts and behavioral scientists) work together to achieve a well-integrated curriculum to fulfill the objectives and provide a steady pipeline of well-tested materials and procedures for use of the teaching staff.

Chart #5:

QUALITY CONTROL SYSTEMS

BUSINESS, INDUSTRIAL & SERVICE ORGANIZATIONS	Characteristics OF QC.	EDUCATIONAL & INSTRUCTIONAL ORGANIZATIONS
Measure selected attributes of quality of product or service	Individualized	Measures selected student's gains
allowable observable limits of tolerance stated	operationally defined	specifies expected behavioral gains for students
system organized at lowest level of production	at production level	involves classroom and/or department basis
highly specified systematic sampling, part of total system	systematic	based upon instructional system
single product or service measured on several dimensions of quality	multi dimensional	specifies several dimensions of student changes expected
statistical sampling of product or service analyzed	utilizes samples	based on samples of students
results of inspection modify production & specification	feedback to other system elements	results will modify other elements of instructional system
regularized routine sampling for inspection, revised specification controlled production	regular time intervals	routine function in instructional system

Chart #6: An Instructional Quality Control System:



5. Individualized instruction based on new media and classroom technology is used to allow all students to learn at a pace fitted to their individual capacities.
6. Management problems are solved with the aid of computers allowing: ready access to student records, efficient and flexible scheduling, and optimum allocation of resources.

Chapter III. Results of a Survey to Locate Existing Instructional Quality Control Systems

In an attempt to locate existing instructional quality control systems, two strategies were used:

a) mailed inquiries were made to national and state research organizations,
b) textual analysis was made of existing California junior college documents,

A. Results of Mailed Inquiries:

Letters were directed to the following ten national and state organizations which have published research on higher education:

1. American Association of Junior Colleges, Research Office
2. American Council on Education, Research Office
3. American College Testing Program
4. Association for Higher Education (NEA)
5. California Junior College Association
6. California State Department of Education
7. Center for the Study of Higher Education, U.C. Berkeley
8. Educational Testing Service Comprehensive College Testing Program
9. University of Washington Testing Bureau
10. Washington Pre-College Testing Program

The question asked was, "Are you aware of any junior colleges, research agencies, or individuals who are engaged in the routine study of student changes for purposes of quality control of instruction?" Eight of the ten answered stating that they were not. Two organizations #1 and #7 did not answer the inquiry. No organization reported an awareness of such a study.

B. Results of Textual Analysis of Junior College Publications and Documents:

Utilizing the Educational Administration Laboratory at UCLA, a textual analysis was made of the following California junior college documents:

a) catalogues (47)

b) accreditation application (23)

c) President's reports (14)

d) Dean of Instruction reports (9)

e) incidental reports for special purposes (11)

f) faculty handbooks (18)

A large number of references were made in these documents to the "improvement of instruction" and the "evaluation of instructional effectiveness." No junior college ignored the need for quality instruction or the improvement of the effectiveness of instruction in its public statements; however, no junior college documented a system which would satisfy the model proposed here.

The typical junior college effort to control quality and improve instruction documents, consists of:

a) non-systematic plans carried out on a sporadic time schedule

b) efforts by presidents and top administration rather than by instructors to control quality

c) a focus on instructor behavior rather than student gain following instruction

d) lack of an outlined follow-up system or, if mentioned, follow-up of only certain types of students (e.g. transfer, vocational)

e) use of a single measure of quality (usually grade-point average)

f) lack of use of samples

g) lack of goals for students defined in measurable statements

h) lack of provision to modify other elements in the instructional system on the basis of findings in any single element

i) no statement that there existed a commitment to change on the basis of findings.

Some non-systematic faculty-centered efforts to improve or control the quality of instruction included:

a) recruitment of superior faculty

b) in-service training programs including sabbatical leave provisions

c) instructor course work on a voluntary basis

d) department meetings and informal discussions

e) administrator or department supervisor observations and ratings of instructors (with, or without, discussion)

f) instructor participation in development of curriculum and course approval

g) use of instructor self-evaluation forms

h) use of instructor ratings by students

i) vertical articulation conferences

Some non-systematic student-centered efforts to improve or control the quality of instruction included:

a) restrictive entrance requirements

b) reports from transfer institutions

c) follow-up interviews for vocational students

d) student interviews during instruction for counseling and scheduling

e) use of standardized test results for counseling and scheduling

f) distribution of phamplets

Some non-systematic institutional-centered efforts to improve or control the quality of instruction included:

a) the addition or improvement of facilities

b) the increasing of the number of books/student

c) accreditation visits

d) use of advisory committees made up of lay citizens

e) use of committees for curricular decisions of revision and adoption of courses

f) institutional research studies to measure enrollment, registration by course, curricular trends, load, salary, budget, staffing, clerical services, supervision, responsibility, etc.

The typical California junior college mentioned at least three of the above efforts at some place in their published documents. The range of efforts to improve or control quality varied from two, to as many as eight devices or plans to improve instruction.

Chapter IV. Summary of Findings Relevant to IQC Systems and Conclusions

This report represents an attempt to determine the extent to which California junior colleges are attempting to assess the quality of their instructional systems in a systematic routine fashion as are industry, business, medicine, the Armed Forces, and other service organizations.

1. From a review of the literature, a mail survey, and a textual analysis of junior college documents, it appears that while California junior colleges as a whole state their concern about the quality and effectiveness of instruction, in no California

junior college is the control of that quality a systematic routine enterprise based on examination of student changes following instruction; rather, it is more often a non-systematic, sporadic examination of the instructor or the institution, and such analyses do not modify the observable characteristics of the instructional system or the students.

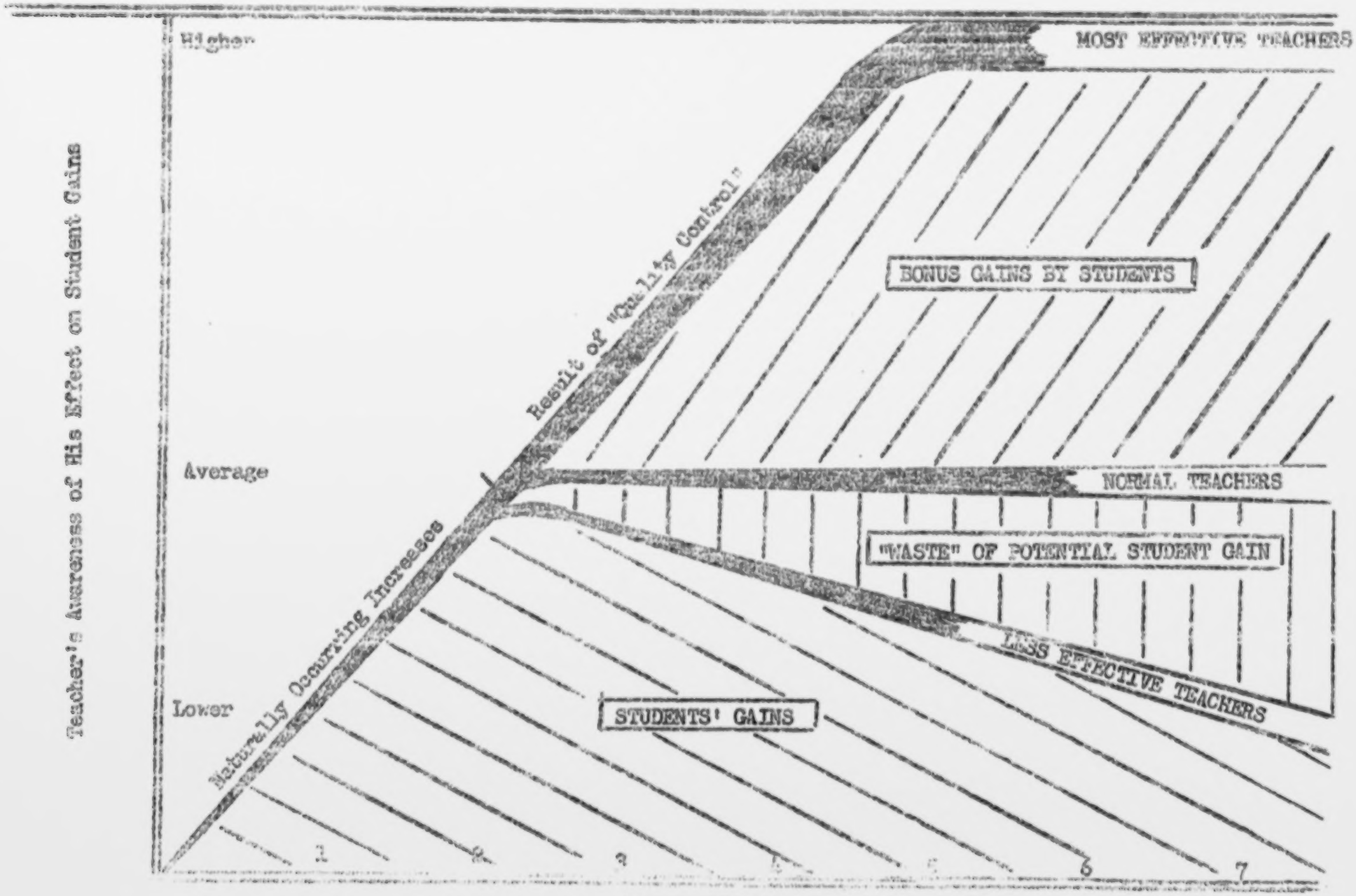
2. Further, it is noted that while academic senates and other faculty organizations exist, they are not typically charged with major responsibility for the control of instructional quality or the improvement of the effectiveness of instruction. This situation is in contrast to the fact that teachers are currently trained by teacher-education programs to be successful in this type of endeavor, and research indicates the improvement to instruction that results from such efforts. (McNeil, 1966)

   Utilization of a quality control system for the classroom has been found to result in greater student gains. The amount of such gain is detailed in Chart #1: Student Gains as Related to Teacher Awareness.

3. In spite of numbers of statements of need for improved evaluation, little change or innovation in evaluation has taken place or is planned for the near future. In 1963, Johnson (1964) found only a "few junior colleges have initiated plans of appraisal and may be designated as 'islands of innovation in evaluation'" (p. 76). The situation remains unchanged today.

   A California junior college president in 1964 suggested in a published report of a CJCA conference on institutional research that "....we objectively assess the degree to which we are.... achieving the objectives stated by the college ...(find) new

Chart #1: STUDENTS' GAINS as Related to Teacher Awareness



and more scientific ways in evaluating the instructional level of our classrooms ...take something from modern industrial management techniques to improve the operation of ...colleges" (MacDonald, 1965).

The Committee on Institutional Research of CJCA found the improvement of instruction to be the most critical need and problem (Peterson, 1965).

Nationally, the U.S. Department of Health, Education, and Welfare; U.S. Office of Education; Committee on Government and Higher Education stated through its chairman, Milton Eisenhower, "Freedom of education and efficiency of operation are not incompatible (WICHE, 1959, p. 8).

Yet, no major collective quality control effort has been organized, and no California junior college has announced a major revision of the techniques that have been in use for several decades in elementary and secondary schools.

Perhaps the situation is best summarized by a quote in one of the replies to the mailed inquiry:

"Unfortunately, for those of us in research, educational administrators typically rely on the folklore, rather than results of substantive research, in arriving at their policy decisions. Hopefully, we will be able to persuade administrators to take a little different approach in the future."

Perhaps the "different approach" might be an instructional quality control system.

Kurland suggests that the time is short in suggesting innovations. As he notes "...the issue is HOW and not WHETHER. The need for change is here and cannot be denied. Already other

agencies whose concern in the past has not been primarily with education--business, industry, government--are considering how they may meet the need (for change). If educators leave to others the determination of how new needs are met and new resources used, they will have little to complain about if the results are not to their liking. They must lead and not follow in adjusting their practices to meet changing needs and in exploiting new resources to help in meeting the needs."

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